Refine Search

Search Results -

Terms	Documents
L31 or L30	24

Database: US Pre-Grant Publication Full-Text Database; US Patents Full-Text Database; US OCR Full-Text Database; EPO Abstracts Database; JPO Abstracts Database; Derwent World Patents Index; IBM Technical Disclosure Bulletins

Search: L32

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Recall Text | Clear | Interrupt

Search History

DATE: Wednesday, September 07, 2005 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR			
L32	L31 or l30	24	L32
L31	L29 and @pd<=20030214	20	L31
L30	L29 and @ad<=20030214	22	L30
L29	L28 not l27	29	L29
L28	vehicle and (modif$ with (fuel adj2 (limit$ or curve)))	29	L28
DB=PGPB,USPT; THES=ASSIGNEE; PLUR=YES; OP=OR			
L27	L23 and ((modif$ or regulat$ or edit$ or control$) with (fuel adj2 curve))	13	L27
L26	L23 and (fuel adj2 curve)	26	L26
L25	L23 and (fuel near2 curve)	55	L25
L24	L23 (fuel near2 curve)	1756	L24
L23	L22 or l21	443	L23
L22	L20 and @ad<=20030214	443	L22

L21	L20 and @pd<=20030214	395	L21
L20	(fuel$ with suppl$ with (curve$ or chart$ or graph$) with (control$ or modif$ or edit$ or regulat$))	472	L20

DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L19	L12 and ((control$ or modif$ or edit$ or requlat$) with fuel$ with suppl$ with (curve or chart or graph))	4	L19
L18	L12 and ((control$ or modif$ or edit$ or requlat$) with fuel$ with suppl$ with (curve or chart or graph)) 7	10058453	L18
L17	L12 and l11	0	L17
L16	L15 and 701/?.ccls.	0	L16
L15	l13 or L14	26	L15
L14	L12 and @pd<=20030214	21	L14
L13	L12 and @ad<=20030214	19	L13
L12	(fuel$ with suppl$ with (curve or chart or graph)) and vehicle	26	L12

DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR

L11	L9 and (load$ with condition$)	1	L11
L10	L9 and rack$	1	L10

DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L9	5097803.pn.	2	L9
L8	L6 and l5	9	L8
L7	L6 not l5	0	L7
L6	L2 and (suppl$ with (modif$ or control$ or regulat$))	9	L6
L5	l3 or L4	13	L5
L4	L2 and @pd<=20030214	13	L4
L3	L2 and @ad<=20030214	6	L3
L2	L1 and (rack with position$) and (load$ with condition$)	13	L2
L1	vehicle and rack and (fuel$ with suppl$)	94	L1

END OF SEARCH HISTORY

First Hit Fwd Refs Previous Doc Next Doc Go to Doc#

Generate Collection Print

L32: Entry 15 of 24 File: USPT Sep 23, 1997

US-PAT-NO: 5670830
DOCUMENT-IDENTIFIER: US 5670830 A

TITLE: Fuel use limiter-equipped hybrid electric car

DATE-ISSUED: September 23, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Koga; Hisamitsu	Okazaki			JP
Kumagai; Naotake	Tokyo			JP
Ohwada; Tomiji	Okazaki			JP
Furukawa; Nobuya	Okazaki			JP
Kato; Masaaki	Kyoto			JP
Kawamura; Nobuyuki	Okazaki			JP

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Mitsubishi Jidosha Kogyo Kabushiki Kaisha	Tokyo			JP	03

APPL-NO: 08/ 431289 [PALM]
DATE FILED: April 28, 1995

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
JP	6-091785	April 28, 1994

INT-CL: [06] F02 B 73/00

US-CL-ISSUED: 307/10.1; 180/65.2, 364/424.026
US-CL-CURRENT: 307/10.1; 180/65.2, 701/81

FIELD-OF-SEARCH: 307/9.1, 307/10.1, 318/139, 318/376, 318/581, 318/580, 180/65.1-65.8, 364/424.01, 364/424.03, 364/424.05, 364/424.1, 364/431.01, 364/423.098, 364/424.026, 364/424.034, 340/425.5, 340/438, 340/439, 340/450.2, 340/636, 290/49, 290/50

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4407132	October 1983	Kawakatsu et al.	180/65.4
☐	5081365	January 1992	Field et al.	290/50
☐	5367455	November 1994	Kitagawa et al.	364/424.01
☐	5495906	March 1996	Furutani et al.	180/65.4
☐	5534759	July 1996	Evans et al.	180/65.1

ART-UNIT: 217

PRIMARY-EXAMINER: Shoop, Jr.; William M.

ASSISTANT-EXAMINER: Elms; Richard T.

ABSTRACT:

A fuel use limiter-equipped hybrid electric car has a battery unit chargeable by an external charger, an electric drive motor capable of driving wheels by electric power from the battery unit, an internal combustion engine for driving a generator to supply electric power to the electric drive motor, and a controller for controlling operations of the electric drive motor and internal combustion engine. The hybrid electric car is further provided with a fuel-use-state detector for detecting a change in a parameter, which change corresponds to a quantity of fuel used by the internal combustion engine since charging of the battery unit by the external charger. The controller limits at least one of an output of the electric drive motor and that of internal combustion engine when from results of a detection by the fuel-use-state detector, the change in the parameter is found to have reached a predetermined value.

28 Claims, 11 Drawing figures

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Hit List

Your wildcard search against 10000 terms has yielded the results below.
Your result set for the last L# is incomplete.
The probable cause is use of unlimited truncation. Revise your search strategy to use limited truncation.

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 10 of 13 returned.

☐ 1. Document ID: US 20040128054 A1

Using default format because multiple data bases are involved.

L27: Entry 1 of 13 File: PGPB Jul 1, 2004

PGPUB-DOCUMENT-NUMBER: 20040128054
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20040128054 A1

TITLE: Method for estimating fuel injector performance

PUBLICATION-DATE: July 1, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Jaliwala, Salim A.	Pontiac	IL	US	
Lukich, Michael S.	Chillicothe	IL	US	
Schuricht, Scott R.	Normal	IL	US	
Sankar, Rammohan	Peoria	IL	US	

US-CL-CURRENT: 701/104; 701/114

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 2. Document ID: US 20020127504 A1

L27: Entry 2 of 13 File: PGPB Sep 12, 2002

PGPUB-DOCUMENT-NUMBER: 20020127504
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020127504 A1

TITLE: Premix burner with firing rate control

PUBLICATION-DATE: September 12, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47

Neville, Thomas B.	Portola Valley	CA	US
Schmotzer, Brian J.	Cleveland Heights	OH	US
Saker, Naim H.	Strongsville	OH	US

US-CL-CURRENT: 431/1; 431/12

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 3. Document ID: US 6801847 B2

L27: Entry 3 of 13 File: USPT Oct 5, 2004

US-PAT-NO: 6801847
DOCUMENT-IDENTIFIER: US 6801847 B2

TITLE: Method for estimating fuel injector performance

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 4. Document ID: US 6312250 B1

L27: Entry 4 of 13 File: USPT Nov 6, 2001

US-PAT-NO: 6312250
DOCUMENT-IDENTIFIER: US 6312250 B1

TITLE: Premix burner with firing rate control

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 5. Document ID: US 6257499 B1

L27: Entry 5 of 13 File: USPT Jul 10, 2001

US-PAT-NO: 6257499
DOCUMENT-IDENTIFIER: US 6257499 B1
** See image for Certificate of Correction **

TITLE: High speed fuel injector

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 6. Document ID: US 5529041 A

L27: Entry 6 of 13 File: USPT Jun 25, 1996

US-PAT-NO: 5529041
DOCUMENT-IDENTIFIER: US 5529041 A

TITLE: Active engine misfire detection system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 7. Document ID: US 5460329 A

L27: Entry 7 of 13 File: USPT Oct 24, 1995

US-PAT-NO: 5460329
DOCUMENT-IDENTIFIER: US 5460329 A
** See image for Certificate of Correction **

TITLE: High speed fuel injector

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 8. Document ID: US 5343780 A

L27: Entry 8 of 13 File: USPT Sep 6, 1994

US-PAT-NO: 5343780
DOCUMENT-IDENTIFIER: US 5343780 A
** See image for Certificate of Correction **

TITLE: Variable power drivetrain engine control system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 9. Document ID: US 3918417 A

L27: Entry 9 of 13 File: USPT Nov 11, 1975

US-PAT-NO: 3918417
DOCUMENT-IDENTIFIER: US 3918417 A

TITLE: Electronic fuel injection system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

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☐ 10. Document ID: US 3896773 A

L27: Entry 10 of 13 File: USPT Jul 29, 1975

US-PAT-NO: 3896773
DOCUMENT-IDENTIFIER: US 3896773 A

TITLE: Electronic fuel injection system

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L23 and ((modif$ or regulat$ or edit$ or control$) with (fuel adj2 curve))	13

Display Format: - Change Format

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Search Results - Record(s) 11 through 13 of 13 returned.

☐ 11. Document ID: US 3871343 A

Using default format because multiple data bases are involved.

L27: Entry 11 of 13 File: USPT Mar 18, 1975

US-PAT-NO: 3871343
DOCUMENT-IDENTIFIER: US 3871343 A
** See image for Certificate of Correction **

TITLE: RECYCLE ENGINE APPARATUS

DATE-ISSUED: March 18, 1975

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Nagai; Masashi	Osaka			JA
Miwa; Kazuhito	Osaka			JA
Tsunetsugu; Masakazu	Osaka			JA
Fujiwara; Tadamaro	Osaka			JA

US-CL-CURRENT: 123/704; 114/337, 123/25E, 123/25R, 123/41.01, 123/568.12, 60/278

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWMC | Draw De

☐ 12. Document ID: US 3824967 A

L27: Entry 12 of 13 File: USPT Jul 23, 1974

US-PAT-NO: 3824967
DOCUMENT-IDENTIFIER: US 3824967 A

TITLE: ELECTRONIC FUEL INJECTION SYSTEM

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWMC | Draw De

☐ 13. Document ID: US 3699935 A

L27: Entry 13 of 13 File: USPT Oct 24, 1972

US-PAT-NO: 3699935
DOCUMENT-IDENTIFIER: US 3699935 A

TITLE: FAIL-SAFE FUEL INJECTION CONTROL ARRANGEMENT FOR INTERNAL COMBUSTION ENGINES

Terms	Documents
L23 and ((modif$ or regulat$ or edit$ or control$) with (fuel adj2 curve))	13

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Generate Collection Print

L27: Entry 1 of 13 File: PGPB Jul 1, 2004

PGPUB-DOCUMENT-NUMBER: 20040128054
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20040128054 A1

TITLE: Method for estimating fuel injector performance

PUBLICATION-DATE: July 1, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Jaliwala, Salim A.	Pontiac	IL	US	
Lukich, Michael S.	Chillicothe	IL	US	
Schuricht, Scott R.	Normal	IL	US	
Sankar, Rammohan	Peoria	IL	US	

APPL-NO: 10/ 329984 [PALM]
DATE FILED: December 27, 2002

INT-CL: [07] G05 D 1/00

US-CL-PUBLISHED: 701/104; 701/114
US-CL-CURRENT: 701/104; 701/114

REPRESENTATIVE-FIGURES: 3

ABSTRACT:

A method of estimating a performance characteristic of a fuel injector is provided. A baseline performance curve for a predetermined type of fuel injector is established. At least one test point for the predetermined type of fuel injector is identified based on the baseline performance curve. A performance characteristic of a selected fuel injector of the predetermined type is measured at the at least one identified test point. A performance characteristic of the selected fuel injector is estimated based on the baseline performance curve and the measured performance characteristics of the selected fuel injector at the identified test point.

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L27: Entry 1 of 13 File: PGPB Jul 1, 2004

DOCUMENT-IDENTIFIER: US 20040128054 A1
TITLE: Method for estimating fuel injector performance

Application Filing Date:
20021227

Detail Description Paragraph:
[0047] Each baseline performance curve 136 may define a relationship between a control signal and a performance characteristic of fuel injector 34 for a particular operating condition of the fuel injection system, such as, for example a particular fluid pressure in fluid supply rail 31. Baseline performance curve 136 may, for example, define a relationship between a current duration and a fuel delivery amount for the particular fluid pressure. Baseline performance curve 136 may be determined by measuring the amount of fuel delivered by a large population of fuel injectors 34 in response to a series of control signals having different current durations. The measured fuel delivery amounts for each control signal may then be averaged to define points on baseline performance curve 136. One skilled in the art will recognize that the points on baseline performance curve 136 may be determined though any statistical analysis, such as, for example, a mean value for the measured fuel delivery amounts. The remainder of baseline performance curve 136 may be determined by interpolating or extrapolating between the measured fuel delivery amounts.

CLAIMS:

8. The method of claim 7, further comprising: estimating an amount of fuel to be delivered by each of the plurality of fuel injectors in response to each of a set of test control signals based on a numerical comparison of the baseline fuel delivery curve and the actual amount of fuel delivered by each of the plurality of fuel injectors in response to the set of test control signals; determining an error representing the difference between the estimated fuel delivery amounts and the baseline fuel delivery amounts for each of the plurality of fuel injectors; and reselecting the set of test control signals to reduce the determined error.

14. A method of estimating an amount of fuel to be delivered by a fuel injector in response to a control signal, comprising: measuring an amount of fuel delivered by a plurality of fuel injectors of a first type in response to a plurality of control signals; establishing a baseline fuel delivery curve for the first type of fuel injector based on the measured amounts of fuel delivery of the plurality of fuel injectors; measuring a first fuel delivery amount for a selected fuel injector of the first type in response to a first control signal and a second fuel delivery amount for the selected fuel injector in response to a second control signal; and estimating a third amount of fuel delivery for the selected fuel injector in response to a third control signal based on a first ratio comparing the first amount of fuel delivery to the baseline fuel delivery curve for the first control signal, a second ratio comparing the second amount of fuel delivery to the baseline fuel delivery curve for the second control signal, and a numerical comparison of the first, second, and third control signals.

15. The method of claim 14, wherein the baseline fuel delivery curve is determined

for a predetermined rail pressure and each of the first, second, and third control signals represents a current duration.

20. A method of identifying a set of test control signals for a fuel injector, comprising: measuring an actual amount of fuel delivered by each of a plurality of fuel injectors in response to a first set of control signals; determining a baseline fuel delivery curve for the plurality of fuel injectors based on the measured actual amounts of fuel delivered in response to each of the first set of control signals; estimating an amount of fuel to be delivered by each of the plurality of fuel injectors in response to each of a first set of control signals based on a numerical comparison of the baseline fuel delivery curve and the actual amount of fuel delivered by each of the plurality of fuel injectors in response to the set of test control signals; determining an error representing the difference between the estimated fuel delivery amounts and the actual fuel delivery amounts for each of the plurality of fuel injectors; and redefining the set of test control signals to reduce the computed error.

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L32: Entry 15 of 24 File: USPT Sep 23, 1997

DOCUMENT-IDENTIFIER: US 5670830 A
TITLE: Fuel use limiter-equipped hybrid electric car

Application Filing Date (1):
19950428

DATE ISSUED (1):
19970923

Brief Summary Text (8):
For example, any attempt to increase the distance coverable by a presently-available electric car per charging inevitably requires mounting of a number of batteries thereon because the capacity of each battery is limited. Use of such many batteries however leads to a substantial increase in the vehicle weight and also occupation of a large space inside the vehicle, resulting in the inconvenience that the power performance and riding comfort of the vehicle are deteriorated. Use of fewer batteries definitely makes it impossible to increase the distance coverable per charging.

Drawing Description Text (6):
FIG. 5 is a flow chart illustrating an operation of a modification of the fuel use limiter-equipped hybrid electric car according to the first embodiment of the present invention;

Detailed Description Text (15):
Here, specific examples of the limitation of the output of the electric drive motor 2 will be described with reference to FIGS. 2 and 3. In each of these diagrams, a solid line indicates performance characteristics when the output of the electric drive motor 2 is unlimited, while a broken line indicates performance characteristics when the output of the electric drive motor 2 is limited. According to the limitation shown in FIG. 2, the torque of the electric drive motor 2 is gradually reduced in a range where the vehicle speed (or the rotational speed of the electric drive motor 2) is equal to and higher than a predetermined value. When the vehicle speed (or the rotational speed of the electric drive motor 2) is lower than the predetermined value, no torque limitation is therefore performed so that desired drive power can be obtained while driving uphill or upon making a start. When the vehicle speed (or the rotational speed of the electric drive motor 2) is equal to or higher than the predetermined value, on the other hand, the torque is limited. Owing to this torque limitation, the driver perceives an insufficient output from the car so that the driver is urged to perform external charging. According to the limitation depicted in FIG. 3, a limitation is imposed on the maximum torque irrespective of the rotational speed of the electric drive motor. By making the driver perceive insufficiency in the maximum torque of the car, the driver is urged to perform external charging. Although the limitation can be practiced in either way, the output limitation method shown in FIG. 2 is preferred from the practical standpoint which has taken into consideration the performance while driving uphill or upon making a start.

Detailed Description Text (26):
Since the driver cannot freely drive the car when the output is lowered as

described above, the driver is motivated to always maintain the capacity of the battery unit at a sufficient level by external charging. Although the electric vehicle is a hybrid electric car, the driver can drive the car without relying upon the internal combustion engine.

CLAIMS:

27. An output control method for a hybrid electric vehicle having a rechargeable battery unit rechargeable by an external charging unit, an electric motor which drives vehicle wheels by obtaining electrical power from said battery unit, an internal combustion engine which drives a generator to recharge said battery unit, and a controller which controls operations of said electric motor and said internal combustion engine, comprising:

detecting a change in a parameter corresponding to an amount of fuel which has been used by said internal combustion engine after said battery unit was recharged by said external charging unit; and

limiting an output of at least one of said electric motor and said internal combustion engine when said change in said parameter reaches a predetermined value.

28. An output control method for a hybrid electric car having a battery unit chargeable by external charging unit, an electric drive motor which drives vehicle wheels by obtaining electrical power from said battery unit, an internal combustion engine which drives said vehicle wheels, and a controller which controls operations of said electric drive motor and said internal combustion engine, comprising:

detecting a change in a parameter corresponding to an amount of fuel which has been used by said internal combustion engine after said battery unit was recharged by said external charging unit; and

limiting an output of at least one of said electric drive motor and said internal combustion engine when said change in said parameter reaches a predetermined value.

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L32: Entry 17 of 24 File: USPT Oct 8, 1991

US-PAT-NO: 5056026
DOCUMENT-IDENTIFIER: US 5056026 A

TITLE: User modifiable fuel injection computer

DATE-ISSUED: October 8, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mitchell; Steven J.	Sylvania, New South Wales			AU
Mitchell; William R.	Sylvania, New South Wales			AU

APPL-NO: 07/ 381691 [PALM]
DATE FILED: July 5, 1989

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
AU	P15283	November 6, 1987

PCT-DATA:

APPL-NO	DATE-FILED	PUB-NO	PUB-DATE	371-DATE	102(E)-DATE
PCT/AU88/00430	November 4, 1988	WO89/04425	May 18, 1989	Jul 5, 1989	Jul 5, 1989

INT-CL: [05] G06F 15/20

US-CL-ISSUED: 364/431.03; 364/431.04, 364/424.04, 73/117.3, 73/119A
US-CL-CURRENT: 701/101; 701/102, 701/35, 73/117.3, 73/119A

FIELD-OF-SEARCH: 364/431.03, 364/431.04, 364/431.05, 364/424.03, 364/424.04, 364/551.01, 73/117.3, 73/119A, 123/417, 123/480

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4084240	April 1978	Lappington	364/431.04
☐	4334425	June 1982	Crane	364/431.01
☐	4376428	March 1983	Hata et al.	364/431.04
☐	4398259	August 1983	Levine	364/431.04

☐	4497057	January 1985	Kato et al.	364/431.04
☐	4677558	June 1987	Bohmer et al.	364/431.03
☐	4725955	February 1988	Kobayashi et al.	123/417
☐	4738238	April 1988	Ohishi	364/431.05
☐	4839811	June 1989	Kanegae et al.	364/424.03
☐	4866618	September 1989	Tamura et al.	364/431.03

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
3318410	November 1984	DE	364/431.03
0155403	September 1985	DE	364/431.03

ART-UNIT: 234

PRIMARY-EXAMINER: Lall; Parshotam S.

ASSISTANT-EXAMINER: Yacura; Gary D.

ATTY-AGENT-FIRM: Townsend and Townsend

ABSTRACT:

A user accessible electornic fuel injection system is disclosed which is modifiable to fit a range of engine configurations, preferably with a staged fuel injection curve and with the capability of recording speed, fuel delivery rate and other engine performance parameters. The system includes computer software which directly controls the fuel injection hardware in an automobile. This software contains a serial communication routine which services the external requests of a control program running on a personal computer, plus engine management software which controls timing functions based on engine related information.

8 Claims, 4 Drawing figures

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L32: Entry 17 of 24 File: USPT Oct 8, 1991

DOCUMENT-IDENTIFIER: US 5056026 A
TITLE: User modifiable fuel injection computer

Abstract Text (1):
A user accessible electornic fuel injection system is disclosed which is modifiable to fit a range of engine configurations, preferably with a staged fuel injection curve and with the capability of recording speed, fuel delivery rate and other engine performance parameters. The system includes computer software which directly controls the fuel injection hardware in an automobile. This software contains a serial communication routine which services the external requests of a control program running on a personal computer, plus engine management software which controls timing functions based on engine related information.

Application Filing Date (1):
19890705

DATE ISSUED (1):
19911008

Brief Summary Text (3):
Motor vehicles are now commonly manufactured with electronic fuel injection (E.F.I.). There are good reasons for the move to E.F.I. A good E.F.I. system will produce considerably more power using less fuel and also generate less pollution than carburetion on the same vehicle. In an age of high fuel costs, energy conservation and restrictive pollution laws, the trend towards E.F.I. will continue.

Brief Summary Text (4):
Present E.F.I. computers however are "black boxes" which are dedicated to a particular engine model. They cannot be readily serviced or interchanged with other types of vehicles. This has the disadvantage that conventional naturally aspirated engines cannot be easily converted to E.F.I. Further, in factory equipped E.F.I. vehicles any subsequent modifications to the engine such as for example turbo charging or increase in the compression ratio, cannot be matched by the required alteration to the E.F.I.

Detailed Description Text (2):
There are three distinct parts to the programmable fuel injection computer according to this invention. These are the hardware (FIG. 1) which remains in the car, the software (FIG. 2) which drives this hardware and the software (FIG. 3) which allows the system to be configured to suit a particular vehicle and which runs on an external personal computer.

Detailed Description Text (5):
As well as these two main programs the in-car computer software has an optional routine 2B which controls an external key-pad. Its purpose is to act as a remote electronic key, for locking and unlocking the car computer. To unlock the system the operator must enter a four digit pin number before an interrupt mask on the engine position sensors will be removed and program control passed to the serial routine. The pin number entered by the operator is compared to an internal

reference stored in EEPROM, giving a 1 in 10,000 chance of guessing the internal key. In addition to this the operator has the ability to create and delete an additional pin number as well as the prime pin number at will. This allows access to the vehicle by persons other than themselves without disclosing their prime pin number, and also allows them to change the prime pin number if necessary. To lock the system a single key is depressed when the engine is off and the ignition is in the accessories or on position. This causes an internal flag to be set in EEPROM and program control to be passed to key-pad routine.

Detailed Description Paragraph Table (1):
TABLE 1 _____ <F1> : RANGE (1) 0-1000 RPM ******** <F2> : RANGE (2) 1000-2000 RPM Press F1-F9 <F3> : RANGE (3) 2000-3000 RPM to view maps. <F4> : RANGE (4) 3000-4000 RPM <F5> : RANGE (5) 4000-5000 RPM <F6> : RANGE (6) 5000-6000 RPM <F7> : RANGE (7) 6000-7000 RPM <F8> : RANGE (8) 7000-8000 RPM Press "L" to load vehicle in formation. <F9> : CURRENT POSITION <F10> : WARM UP CHARACTERISTICS <S> : STORE VECHICLE INFORMATION TO DISK <L> : LOAD VECHICLE INFORMATION FROM DISK ********* <M> : SUB MENU All secondary functions in sub menu press `M` <ESC> : EXIT to system _____

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L32: Entry 13 of 24 File: USPT May 11, 1999

DOCUMENT-IDENTIFIER: US 5901684 A
TITLE: Method for processing crankshaft speed fluctuations for control applications

Application Filing Date (1):
19980914

DATE ISSUED (1):
19990511

Brief Summary Text (3):
The present invention relates generally to internal combustion engines in automotive vehicles and, more particularly, to a method of determining combustion stability of the engine and controlling the fuel injection pulsewidth to fuel injectors for the engine, especially following a cold start.

Brief Summary Text (5):
Automotive vehicles commonly employ a port-injected internal combustion engine in which a fuel injector sprays fuel into air in an intake manifold of the engine near an intake valve of a cylinder as air gets pulled into the cylinder during the cylinder's intake stroke. The conventional fuel injector is typically controlled in response to a fuel injection pulsewidth signal in which the pulsewidth determines the amount of fuel injected into the corresponding cylinder of the engine. The fuel injection pulsewidth signal can be implemented to follow a programmed target fuel injection curve. The programmed target fuel injection curve determines the fuel injection pulsewidth and is generally utilized to provide adequate engine performance when feedback engine control is not available.

Brief Summary Text (6):
Many automotive vehicles commonly employ an oxygen (O.sub.2) sensor generally disposed upstream of the exhaust system for sensing the oxygen level in the exhaust gas emitted from the engine. The oxygen sensor can serve to provide a feedback signal to control engine operation and adjust fuel injection to the engine to achieve good engine performance. However, some conventional oxygen sensors are required to warm up to a sufficiently high temperature before an accurate oxygen sensor reading may be obtained. Also, following an engine start, the oxygen sensor and processing devices initially may not have acquired enough information to provide adequate feedback control. Therefore, for a period of time immediately following cold start up of the vehicle engine, the oxygen sensor may not be capable of providing accurate information with which the engine may be controlled to operate to achieve low hydrocarbon emissions. As a consequence, excessive hydrocarbon emissions may be emitted from the vehicle within the immediate period following start up of the engine.

Brief Summary Text (10):
It is therefore one object of the present invention to provide for control of a vehicle engine based on a learned measurement of combustion stability of the engine.

Brief Summary Text (11):
It is another object of the present invention to provide for a learned combustion

stability value which may be employed to control engine operation while maintaining adequate driveability and performance of the vehicle.

Brief Summary Text (15):
According to one embodiment, the learned combustion stability value is advantageously employed so as to modify the fuel injection to an internal combustion engine, especially following a cold engine start so as to reduce hydrocarbon emissions. This is accomplished by modifying a programmed target fuel injection signal pulsewidth as a function of the learned combustion related value so as to reduce the fuel injected into the engine by fuel injectors. By reducing fuel injection as a function of the learned combustion stability value, reduced hydrocarbon emissions can be realized while maintaining good driveability and performance of the vehicle.

Drawing Description Text (3):
FIG. 1 is a schematic diagram of an electronic fuel injection system illustrated in operational relationship with an internal combustion engine and exhaust system of an automotive vehicle;

Drawing Description Text (4):
FIG. 2 is a block diagram further illustrating components of a vehicle used for sensing engine speed from a crankshaft and modifying fuel injection to the engine;

Drawing Description Text (7):
FIG. 5 is a graph illustrating engine fuel injection modification and shows a programmed fuel control curve contrasted with a modified fuel control curve; and

Detailed Description Text (2):
Turning now to FIG. 1, an electronic fuel injection system 10 is illustrated in operational relationship with an internal combustion engine 12 and an exhaust system 14 of an automotive vehicle (not shown). The exhaust system 14 includes an exhaust manifold 16 connected to the engine 12 and a catalyst 18 such as a catalytic converter connected by an upstream conduit 20 to the exhaust manifold 16. The exhaust system 14 also includes a downstream conduit 22 connected to the catalyst 18 and extending downstream to a muffler (not shown). The internal combustion engine 12 is a fuel injected engine and includes an intake manifold 24 connected to the engine 12 and a throttle body 26 connected to the intake manifold 24. The engine 12 also includes an air filter 28 connected by a conduit 29 to the throttle body 26. It should be appreciated that the engine 12 and exhaust system 14 are conventional and known in the art.

Detailed Description Text (4):
Referring to FIG. 2, a block diagram is provided which illustrates the components of the automotive vehicle 25 for measuring engine speed, determining a combustion related value and modifying fuel injection to the engine. A partial cut-away view of engine 12 is shown illustrating one of a multiple of cylinders 42 in the engine 12. As illustrated, a piston 44 is disposed in the cylinder 42 and is operatively connected by a connecting rod 46 to a crankshaft 48. A camshaft 50 is used to open and close at least one valve (not shown) of the cylinder 42 for various strokes of the piston 44. The piston 44 is illustrated in the expansion (power) stroke of a four stroke engine. In such a four stroke engine, the strokes include intake, compression, expansion (power), and exhaust. During the exhaust stroke, exhaust gases flow from the cylinder 42 via at least one valve and through the exhaust system 14. Although the embodiment shown is a four stroke engine, the principles of the present invention can also be applied to other internal combustion engines, such as a two stroke engine. It should be appreciated that a spark plug is present in the preferred embodiment, although it is not illustrated herein.

Detailed Description Text (5):
The automatic vehicle 25 further includes a sensor target 52 operatively connected

to the crankshaft 48. The sensor target 52 has at least one, and preferably a plurality of trip points, which in the preferred embodiment are provided as slots 54, formed by teeth 56. The vehicle 25 also includes a crankshaft sensor 58 for communicating with the sensor target 52 and a camshaft sensor 60 in communication with the camshaft 50. The vehicle 25 further includes the manifold absolute pressure (MAP) sensor 36, throttle position sensor 34, a vehicle speed sensor 62 and an engine temperature sensor 38. The outputs of the sensors 58, 60, 36, 34, 62 and 38 communicate with the engine controller 30.

Detailed Description Text (6):
The engine controller 30 includes a micro-controller 64 with a digital filter 66, memory 68, signal conditioning circuitry 70 and analog-to-digital (A/D) converters 72 to process outputs from the various sensors according to the methodology to be described hereinafter. In the preferred embodiment, the outputs of crankshaft sensor 58, camshaft sensor 60, and vehicle speed sensor 62 communicate with the micro-controller 64 via appropriate signal conditioning circuitry 70 which is particularized to the type of sensor employed. The output of the manifold absolute pressure sensor 36, throttle position sensor 34 and engine coolant temperature sensor 38 communicate with the micro-controller 64 via the A/D converters 72. The engine controller 30 including microcontroller 64 with digital filter 66 is used to determine a learned combustion stability value and modify a fuel injection control signal as will be described in more detail hereinafter. Memory 68 is a generic memory which may include Random Access Memory (RAM), Read Only Memory (ROM) or other appropriate memory. It should also be appreciated that the engine controller 30 also includes various timers, counters and like components.

Detailed Description Text (10):
In order to illustrate operation of the fuel injection modification methodology 100, FIG. 5 illustrates a programmed target fuel injection curve 126 contrasted with a reduced fuel injection curve 128 as provided by the fuel modification multiplier determined as described in connection with FIG. 4. For a period of time following vehicle startup, the fuel modification methodology 100 utilizes the combustion metric value so as to reduce the amount of fuel injected into the individual cylinders of the engine as may be appropriate to reduce hydrocarbon emissions emitted from the vehicle. The time period for modifying the fuel injection preferably lasts long enough until effective feedback control with the oxygen sensor may be realized. The time period may be set for forty seconds, according to one example, however, varying time periods may be necessary depending upon the engine, temperature, fuel combustibility as well as other factors. According to the example shown, it is preferred that the fuel modification methodology 100 be utilized to reduce the amount of fuel injected into the engine. It is also preferred that the modified fuel injection curve 128 does not exceed the programmed target fuel injection curve 126.

Detailed Description Text (11):
Referring to FIG. 6, a methodology 130 is illustrated for both computing a learned combustion-related value and utilizing the combustion-related value to provide fuel modification to fuel injectors of the engine. Methodology 130 begins with block 132 to obtain engine data such as engine speed, manifold absolute pressure and coolant temperature. Methodology 130 proceeds to block 134 to calculate the combustion metric value as was described above in connection with FIG. 3. An average combustion metric value is computed pursuant to block 136. Also, a determined expected combustion metric value is determined from the engine data and calibrations as provided in block 138. The computed average combustion metric value and the determined expected combustion metric value are compared via block 140 to provide a difference output between the two input signals. According to block 142, methodology 100 uses proportional-integral-differential (PID) control to control the combustion quality of the engine by calculating and applying a fuel injector pulsewidth multiplier to the programmed fuel injection signal to reduce the amount of fuel applied to the engine. Fuel reduction is provided, yet maintaining adequate

driveability and performance of the vehicle, with reduced emissions when possible, especially following a cold engine start of the vehicle. Accordingly, the modified fuel injection reduces hydrocarbon emissions while maintaining good driveability of the vehicle when the oxygen sensor and/or feedback control may not be available.

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L27: Entry 9 of 13 File: USPT Nov 11, 1975

DOCUMENT-IDENTIFIER: US 3918417 A
TITLE: Electronic fuel injection system

Application Filing Date (1):
19721027

DATE ISSUED (1):
19751111

Brief Summary Text (7):
In relation to the primary engine operating parameter, the fuel quantity Q is defined by a linear fuel control curve characterized by a slope and an offset. The slope of the fuel control curve is determined by the preselected function of the secondary engine operating parameter which is multiplicatively related to the primary engine operating parameter. The offset of the fuel control curve is determined by the preselected function of the secondary engine operating parameter which is additively related to the primary engine operating parameter.

Detailed Description Text (42):
which defines a linear or straight-line fuel control curve F as shown in FIG. 4.

Detailed Description Text (43):
Referring to FIG. 4, the fuel control curve F is described within a two-dimensional coordinate system defined by a horizontally disposed X-axis and a vertically disposed Y-axis which perpendicularly intersect at an origin O. The primary control time period T.sub.p, which is defined as a preselected function of the air pressure within the intake manifold 20, is plotted along the X-axis. The fuel quantity Q is plotted along the Y-axis. The fuel control curve F is characterized by a slope and an offset. The slope of the fuel control curve F is given by the ratio (Y'/x') of the distance Y' traced along the Y-axis to the distance x' traced along the X-axis when an imaginary point is moved a distance a along the fuel control curve F. The offset of the fuel control curve F is given by the distance b between the origin O and the intersection U of the fuel control curve F with the Y-axis. This intersection is only theoretical since the primary control time period T.sub.p is never zero in actual practice.

Detailed Description Text (44):
Referring to equation 3, the slope of the fuel control curve F is defined by the term (1 + I.sub.c /I.sub.d). Changes in the slope term of equation 3, which are defined as a preselected function of the temperature of the engine 10, have the effect of rotating the fuel control curve F about the Y-axis intercept U as depicted by the double-headed arrow 178. The offset of the fuel control curve F is defined by the term (L.sub.i - L.sub.f) C/I.sub.d. Changes in the offset term of equation 3, which are defined as a preselected function of the supply voltage of the vehicle battery 36, have the effect of vertically shifting the Y-axis intercept U of the fuel control curve F as depicted by the double-headed arrow 180. Depending upon the relative magnitudes of the initial level L.sub.i and the final level L.sub.f of the control voltage V, the net sign of the offset term (L.sub.i - L.sub.f) C/I.sub.d may be plus (+) or minus (-). Accordingly, the Y-axis intercept U of the fuel control curve F may be shifted above or below the origin O. Since the

final level L.sub.f is greater than the initial level L.sub.i in FIG. 2, the Y-axis intercept U of the fuel control curve F is appropriately located below the origin O in FIG. 4.

Detailed Description Text (45):
The net change in the amount of fuel delivered to the engine 10 as a result of variations in the temperature of the engine 10 is dependent upon the pressure of the air within the intake manifold 20. Given a constant air mass within the intake manifold 20, the intake air pressure is directly proportional to the intake air temperature. Further, the amount of fuel condensation and the amount of fuel vaporization are directly proportional to the quantity of fuel injected into the intake manifold 20 as primarily determined by the intake air pressure. Thus, the intake air temperature, the engine coolant temperature, and the injected fuel temperature are multiplicatively related as engine operating parameters to the intake air pressure. Consequently, the slope (y'/x') of the fuel control curve F should be a function of these various temperatures only. This criteria is satisfied by the slope term (1 + I.sub.c /I.sub.d) of equation 3. Preferably, only the charge current I.sub.c is controlled as a function of engine temperature, while the discharge current I.sub.d is fixed.

Detailed Description Text (46):
The net change in the amount of fuel delivered to the engine 10 as a result of variations in the supply voltage of the vehicle battery 36 is independent of the pressure of the air within the intake manifold 20. Hence, the battery supply voltage is additively related as an engine operating parameter to the intake air pressure. Therefore, the offset b of the fuel control curve F should be a function of the vehicle battery voltage only. Assuming the discharge current I.sub.d is fixed, this criteria is satisfied by the offset term (L.sub.i - L.sub.f) C/I.sub.d of equation 3. The magnitude of the final level L.sub.f is controlled as a function of the battery supply voltage.

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Refine Search

Your wildcard search against 10000 terms has yielded the results below.

Your result set for the last L# is incomplete.

The probable cause is use of unlimited truncation. Revise your search strategy to use limited truncation.

Search Results -

Terms	Documents
L23 and ((modif$ or regulat$ or edit$ or control$) with (fuel adj2 curve))	13

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L27

Refine Search | Recall Text | Clear | Interrupt

Search History

DATE: Wednesday, September 07, 2005 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=PGPB,USPT; THES=ASSIGNEE; PLUR=YES; OP=OR			
L27	L23 and ((modif$ or regulat$ or edit$ or control$) with (fuel adj2 curve))	13	L27
L26	L23 and (fuel adj2 curve)	26	L26
L25	L23 and (fuel near2 curve)	55	L25
L24	L23 (fuel near2 curve)	1756	L24
L23	L22 or l21	443	L23
L22	L20 and @ad<=20030214	443	L22
L21	L20 and @pd<=20030214	395	L21
L20	(fuel$ with suppl$ with (curve$ or chart$ or graph$) with (control$ or modif$ or edit$ or regulat$))	472	L20

DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES;

OP=OR

L19	L12 and ((control$ or modif$ or edit$ or requlat$) with fuel$ with suppl$ with (curve or chart or graph))	4	L19
L18	L12 and ((control$ or modif$ or edit$ or requlat$) with fuel$ with suppl$ with (curve or chart or graph)) 7	10058453	L18
L17	L12 and l11	0	L17
L16	L15 and 701/?.ccls.	0	L16
L15	l13 or L14	26	L15
L14	L12 and @pd<=20030214	21	L14
L13	L12 and @ad<=20030214	19	L13
L12	(fuel$ with suppl$ with (curve or chart or graph)) and vehicle	26	L12

DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR

L11	L9 and (load$ with condition$)	1	L11
L10	L9 and rack$	1	L10

DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES; OP=OR

L9	5097803.pn.	2	L9
L8	L6 and l5	9	L8
L7	L6 not l5	0	L7
L6	L2 and (suppl$ with (modif$ or control$ or regulat$))	9	L6
L5	l3 or L4	13	L5
L4	L2 and @pd<=20030214	13	L4
L3	L2 and @ad<=20030214	6	L3
L2	L1 and (rack with position$) and (load$ with condition$)	13	L2
L1	vehicle and rack and (fuel$ with suppl$)	94	L1

END OF SEARCH HISTORY

28-5601. Definitions

In this article and articles 2 and 5 of this chapter, unless the context otherwise requires:

1. "Blending":

(a) Means the mixing of one or more products, regardless of the original character of the product blended, if the product obtained by the blending is capable of use or otherwise sold for use in the generation of power for the propulsion of a motor vehicle, aircraft or watercraft.

(b) Does not include blending that occurs in the process of refining by the original refiner of crude petroleum or the blending of products known as lubricating oil and greases.

2. "Bulk end user" means a person who receives into the person's own storage facilities in transport truck lots motor fuel for the person's own consumption.

3. "Bulk plant" means a motor fuel storage and distribution facility that is not a terminal and from which motor fuel may be removed at a rack.

4. "Bulk transfer" means any transfer of motor fuel from one location to another by pipeline tender or marine delivery within the bulk transfer terminal system.

5. "Bulk transfer terminal system" means the motor fuel distribution system consisting of refineries, pipelines, marine vessels and terminals. Motor fuel in a refinery, pipeline, vessel or terminal is in the bulk transfer terminal system. Motor fuel in the fuel supply tank of any engine, or in any tank car, rail car, trailer, truck or other equipment suitable for ground transportation, is not in the bulk transfer terminal system.

6. "Consumer" means the end purchaser of motor vehicle fuel for use on the highways in this state, the end purchaser of motor vehicle fuel for use in watercraft on waterways of this state or the end purchaser of aviation fuel for use in aircraft.

7. "Destination state" means the state, territory or foreign country to which motor fuel is directed for delivery into a storage facility, a receptacle, a

container or a type of transportation equipment for the purpose of resale or use.

8. "Distributor" means a person who acquires motor fuel from a supplier or another distributor for subsequent sale or use and who may blend or import into or export from this state motor fuel in the original package or container or otherwise but excluding a person who imports motor fuel in the fuel tank of a motor vehicle or aircraft.

9. "Dyed diesel fuel" means diesel fuel that is dyed pursuant to United States internal revenue service regulations or requirements, including any invisible marker requirements.

10. "Fuel tank" means a receptacle on a motor vehicle, watercraft or aircraft from which fuel is supplied for the propulsion of the motor vehicle, watercraft or aircraft, excluding a cargo tank but including a separate compartment of a cargo tank used as a fuel tank and an auxiliary tank or receptacle of any kind from which fuel is supplied for the propulsion of the motor vehicle, watercraft or aircraft, whether or not the tank or receptacle is directly connected to the fuel supply line of the motor vehicle, watercraft or aircraft.

11. "Highway" means any way or place in this state of whatever nature that is maintained by public monies and that is open to the use of the public for purposes of vehicular travel, including a highway under construction.

12. "In this state" means any way or place within the exterior limits of the state of Arizona that is maintained by public monies, including any such way or place that is owned by or ceded to the United States of America.

13. "Indian reservation" means all lands that are within the limits of areas set aside by the United States for the exclusive use and occupancy of Indian tribes by treaty, law or executive order and that are currently recognized as Indian reservations by the United States department of the interior.

14. "Indian tribe" means any organized nation, tribe, band or community recognized as an Indian tribe by the United States department of the interior.

15. "Interstate user" means a person registering a use class motor vehicle under chapter 7, article 7 or 8 of this title or section 28-2321 or 28-2324.

16. "Invoiced gallons" means the gallons actually billed on an invoice in payment to a supplier.

17. "Light class motor vehicle" means a motor vehicle that uses use fuel on the highways in this state but excludes a road tractor, truck tractor, truck or passenger carrying vehicle having a declared gross vehicle weight of more than twenty-six thousand pounds or having more than two axles.

18. "Motor fuel" means motor vehicle fuel, use fuel and aviation fuel.

19. "Motor vehicle" means a self-propelled vehicle required to be licensed or subject to licensing for operation on a highway.

20. "Permissive supplier" means an out-of-state supplier that elects, but is not required, to have a supplier's license pursuant to this article.

21. "Person" means an individual, firm, partnership, joint venture, association, corporation, estate, trust, business trust, receiver or syndicate, this state, any county, city, town, district or other subdivision of this state, an Indian tribe, or any other group or combination acting as a unit.

22. "Position holder":

(a) Means the person who holds the inventory position in motor fuel in a terminal, as reflected on the records of the terminal operator. For the purposes of this subdivision, "a person who holds the inventory position in motor fuel" means a person who has a contract with the terminal operator for the use of storage facilities and terminaling services for fuel at the terminal.

(b) Includes a terminal operator who owns fuel in the terminal.

23. "Public monies" means those monies that are received by this state and that are derived all or in part from tax revenues or other funding sources.

24. "Qualified terminal" means a terminal that is designated as a qualified terminal pursuant to the United States internal revenue code, regulation and practices and that has been assigned a terminal control number by the United States internal revenue service.

25. "Rack" means a mechanism for delivering motor fuel from a refinery, a

terminal or a bulk plant into a railroad tank car, a transport truck or other means of transfer that is outside the bulk transfer terminal system.

26. "Refiner" means any person who owns, operates or otherwise controls a refinery within the United States.

RCW 82.36.010
Definitions.

The definitions in this section apply throughout this chapter unless the context clearly requires otherwise.

(1) "Blended fuel" means a mixture of motor vehicle fuel and another liquid, other than a de minimis amount of the liquid, that can be used as a fuel to propel a motor vehicle.

(2) "Bond" means a bond duly executed with a corporate surety qualified under chapter 48.28 RCW, which bond is payable to the state of Washington conditioned upon faithful performance of all requirements of this chapter, including the payment of all taxes, penalties, and other obligations arising out of this chapter.

(3) "Bulk transfer" means a transfer of motor vehicle fuel by pipeline or vessel.

(4) "Bulk transfer-terminal system" means the motor vehicle fuel distribution system consisting of refineries, pipelines, vessels, and terminals. Motor vehicle fuel in a refinery, pipeline, vessel, or terminal is in the bulk transfer-terminal system. Motor vehicle fuel in the fuel tank of an engine, motor vehicle, or in a railcar, trailer, truck, or other equipment suitable for ground transportation is not in the bulk transfer-terminal system.

(5) "Dealer" means a person engaged in the retail sale of motor vehicle fuel.

(6) "Department" means the department of licensing.

(7) "Director" means the director of licensing.

(8) "Evasion" or "evade" means to diminish or avoid the computation, assessment, or payment of authorized taxes or fees through:

(a) A knowing: False statement; misrepresentation of fact; or other act of deception; or

(b) An intentional: Omission; failure to file a return or report; or other act of deception:

(9) "Export" means to obtain motor vehicle fuel in this state for sales or distribution outside the state.

(10) "Highway" means every way or place open to the use of the public, as a matter of right, for the purpose of vehicular travel.

(11) "Import" means to bring motor vehicle fuel into this state by a means of conveyance other than the fuel supply tank of a motor vehicle.

(12) "Licensee" means a person holding a license issued under this chapter.

(13) "Marine fuel dealer" means a person engaged in the retail sale of motor vehicle fuel whose place of business and/or sale outlet is located upon a navigable waterway.

(14) "Motor vehicle fuel blender" means a person who produces blended motor fuel outside the bulk transfer-terminal system.

(15) "Motor vehicle fuel distributor" means a person who acquires motor vehicle fuel from a supplier, distributor, or licensee for subsequent sale and distribution.

(16) "Motor vehicle fuel exporter" means a person who purchases motor vehicle fuel in this state and directly exports the fuel by a means other than the bulk transfer-terminal system to a destination outside of the state. If the exporter of record is acting as an agent, the person for whom the agent is acting is the exporter. If there is no exporter of record, the owner of the motor fuel at the time of exportation is the exporter.

(17) "Motor vehicle fuel importer" means a person who imports motor vehicle fuel into the state by a means other than the bulk transfer-terminal system. If the importer of record is acting as an agent, the person for whom the agent is acting is the importer. If there is no importer of record, the owner of the motor vehicle fuel at the time of importation is the importer.

(18) "Motor vehicle fuel supplier" means a person who holds a federal certificate of registry that is issued under the internal revenue code and authorizes the person to enter into federal tax-free transactions on motor vehicle fuel in the bulk transfer-terminal system.

(19) "Motor vehicle" means a self-propelled vehicle designed for operation upon land utilizing motor vehicle fuel as the means of propulsion.

(20) "Motor vehicle fuel" means gasoline and any other inflammable gas or liquid, by whatsoever name the gasoline, gas, or liquid may be known or sold, the chief use of which is as fuel for the propulsion of motor vehicles or motorboats.

(21) "Person" means a natural person, fiduciary, association, or corporation. The term "person" as applied to an association means and includes the partners or members thereof, and as applied to corporations, the officers thereof.

(22) "Position holder" means a person who holds the inventory position in motor vehicle fuel, as reflected by the records of the terminal operator. A person holds the inventory position in motor vehicle fuel if the person has a contractual agreement with the terminal for the use of storage facilities and terminating services at a terminal with respect to motor vehicle fuel. "Position holder" includes a terminal operator that owns motor vehicle fuel in their terminal.

(23) "Rack" means a mechanism for delivering motor vehicle fuel from a refinery or terminal into a truck, trailer, railcar, or other means of nonbulk transfer.

(24) "Refiner" means a person who owns, operates, or otherwise controls a refinery.

(25) "Removal" means a physical transfer of motor vehicle fuel other than by evaporation, loss, or destruction.

(26) "Terminal" means a motor vehicle fuel storage and distribution facility that has been assigned a terminal control number by the internal revenue service, is supplied by pipeline or vessel, and from which reportable motor vehicle fuel is removed at a rack.

(27) "Terminal operator" means a person who owns, operates, or otherwise controls a terminal.

(28) "Two-party exchange" or "buy-sell agreement" means a transaction in which taxable motor vehicle fuel is transferred from one licensed supplier to another licensed supplier under an exchange or buy-sell agreement whereby the supplier that is the position holder agrees to deliver taxable motor vehicle fuel to the other supplier or the other supplier's customer at the rack of the terminal at which the delivering supplier is the position holder.

[2001 c 270 § 1; 1998 c 176 § 6. Prior: 1995 c 287 § 1; 1995 c 274 § 20; 1993 c 54 § 1; 1991 c 339 § 13; 1990 c 250 § 79; 1987 c 174 § 1; 1983 1st ex.s. c 49 § 25; 1981 c 342 § 1; 1979 c 158 § 223; 1977 ex.s. c 317 § 1; 1971 ex.s. c 156 § 1; 1967 c 153 § 1; 1965 ex.s. c 79 § 1; 1961 c 15 § 82.36.010; prior: 1939 c 177 § 1; 1933 c 58 § 1; RRS § 8327-1; prior: 1921 c 173 § 1.]

NOTES:

Severability -- 1990 c 250: See note following RCW 46.16.301.

Effective date -- 1987 c 174: "This act is necessary for the immediate preservation of the public peace, health, and safety, the support of the state government and its existing public institutions, and shall take effect June 1, 1987." [1987 c 174 § 8.]

Severability -- Effective date -- 1983 1st ex.s. c 49: See RCW 36.79.900 and 36.79.901.

Effective date -- 1981 c 342: "This act is necessary for the immediate preservation of the public peace, health, and safety, the support of the state government and its existing public institutions, and shall take effect July 1, 1981. This act shall only take effect upon the passage of Senate Bills No. 3669 and 3699, and if Senate Bills No. 3669 and 3699 are not both enacted by the 1981 regular session of the legislature this amendatory act shall be null and void in its entirety." [1981 c 342 § 12.] Senate Bills No. 3669 and 3699 became 1981 c 315 and 1981 c 316, respectively.

Severability -- 1981 c 342: "If any provision of this act or its application to any person or circumstance is held invalid, the remainder of the act or the application of the provision to other persons or circumstances is not affected." [1981 c 342 § 13.]

Effective dates – 1977 ex.s. c 317: "This 1977 amendatory act is necessary for the immediate preservation of the public peace, health, and safety, the support of the state government and its existing public institutions, and shall take effect on July 1, 1977, except for section 9, which shall take effect on September 1, 1977." [1977 ex.s. c 317 § 24.]

Severability – 1977 ex.s. c 317: "If any provision of this 1977 amendatory act, or its application to any person or circumstance is held invalid, the remainder of the act, or the application of the provision to other persons or circumstances is not affected." [1977 ex.s. c 317 § 23.]

www.michigan.gov
(To Print: use your browser's print function)
Release Date: December 17, 2001
Last Update: November 03, 2004

Motor Fuel Act Key Definitions

Motor Fuel Tax Act
Effective April 1, 2001

BLENDER: Any person who produces blended motor fuel outside of the bulk transfer/terminal system.

BULK END USER: A person who receives into the person's own storage facilities by transport truck or tank wagon motor fuel for the person's own consumption

DIESEL FUEL: Any liquid other than gasoline that is capable of use as a fuel or a component of a fuel in a motor vehicle that is propelled by a diesel-powered engine or in a diesel-powered train. Diesel fuel includes number 1 and number 2 fuel oils, kerosene, dyed diesel fuel, and mineral spirits. Diesel fuel also includes any blendstock or additive that is sold for blending with diesel fuel, any liquid prepared, advertised, offered for sale, sold for use as, or used in the generation of power for the propulsion of a diesel-powered engine, airplane, or marine vessel. An additive or blendstock is presumed to be sold for blending unless a certification is obtained for federal purposes that the substance is for a use other than blending for diesel fuel. Diesel fuel does not include an excluded liquid.

DYED DIESEL FUEL: Diesel fuel that is dyed in accordance with internal revenue service rules or pursuant to any other internal revenue service requirements, including any invisible marker requirements.

ELIGIBLE PURCHASER: A person who has been authorized by the department under section 75 to make the election under section 74. Purchases fuel from a licensed Supplier and may elect to defer payment of the tax until one (1) business day before the tax is due to be remitted to the department by the Supplier.

EXPORT: To obtain motor fuel in this state for sale or other distribution outside of this state. Motor fuel delivered outside of this state by or for the seller constitutes an export by the seller and motor fuel delivered outside of this state by or for the purchaser constitutes an export by the purchaser.

FUEL TRANSPORTATION VEHICLE: A vehicle designed or used to transport motor fuel on the **public** roads or highways. Fuel transportation vehicle includes, but is not limited to, a transport truck and a tank wagon. Fuel transportation vehicle does not include a vehicle transporting a nurse tank or limited volume auxiliary-mounted supply tank used for fueling an implement of husbandry.

GASOHOL: A blended motor fuel composed of gasoline and fuel grade ethanol.

GASOLINE: Includes gasoline, alcohol, gasohol, casing head or natural gasoline, benzol, benzine, naphtha, and any blendstock, additive, or other products including methanol that is sold for blending with gasoline other than products typically sold in containers of less than 5 gallons. Gasoline also includes a liquid prepared, advertised, offered for sale, sold for use as, or used in the generation of power for the propulsion of a motor vehicle, airplane, or marine vessel, including a product obtained by blending together any 1 or more products of petroleum, with or without another product, and regardless of the original character of the petroleum products blended, if the product obtained by the blending is capable of use in the generation of power for the propulsion of a motor vehicle, airplane, or marine vessel. The blending of all of the above named products, regardless of their name or characteristics, shall conclusively be presumed to have been done to produce motor fuel, unless the product obtained by the blending is entirely incapable of use as motor fuel. Gasoline also includes transmix. Gasoline does not include diesel fuel. An additive or blendstock is presumed to be sold for blending unless a certification is obtained for federal purposes that the substance is for a use other than blending for gasoline.

IMPORT: To bring motor fuel into this state by motor vehicle, marine vessel, pipeline, or any other means. However, import does not include bringing motor fuel into this state in the fuel supply tank of a motor vehicle if the motor fuel is used to power that motor vehicle. Motor fuel delivered into this state from outside of this state by or for the seller constitutes an import by the seller, and motor fuel delivered into this state from out of this state by or for the purchaser constitutes an import by the purchaser.

KEROSENE: All grades of kerosene, including, but not limited to, the 2 grades of kerosene, No. 1-K and No. 2-K, commonly known as K-1 kerosene and K-2 kerosene respectively, described in American society for testing and materials specifications D-3699, in effect on January 1,

1999, and kerosene-type jet fuel described in American society for testing and materials specification D and military specifications MIL-Tr and MIL-Td (grades jp and jp-8), and any successor internal revenue service rules or regulations, as the specification for kerosene and kerosene-type jet fuel. Kerosene does not include an excluded liquid.

MOTOR FUEL: Gasoline, diesel fuel, kerosene, a mixture of gasoline, diesel fuel, or kerosene, or a mixture of gasoline, diesel fuel, or kerosene and any other substance.

MOTOR VEHICLE: A vehicle that is propelled by an internal combustion engine or motor and is designed to permit the vehicle's mobile use on the public roads or highways of this state. Motor vehicle does not include any of the following:

(i) An implement of husbandry.

(ii) A train or other vehicle operated exclusively on rails.

(iii) Machinery designed principally for off-road use and not licensed for on-road use.

(iv) A stationary engine.

POSITION HOLDER: A person who has a contract with a terminal operator for the use of storage facilities and other terminal services for motor fuel at the terminal, as reflected in the records of the terminal operator. Position holder includes a terminal operator who owns motor fuel in the terminal.

RACK: A mechanism for delivering motor fuel from a refinery, a terminal, or a marine vessel into a railroad tank car, a transport truck, a tank wagon, the fuel supply tank of a marine vessel, or other means of transfer outside of the bulk transfer/terminal system.

REFINERY: A facility used to produce motor fuel from crude oil, unfinished oils, natural gas liquids, or other hydrocarbons and from which motor fuel may be removed by pipeline, by marine vessel, or at a rack.

REMOVAL: A physical transfer other than by evaporation, loss, or destruction of motor fuel from a terminal, manufacturing plant, customs custody, pipeline, marine vessel, or refinery that stores motor fuel.

SUPPLIER: Means a person who meets all of the following

requirements:

(i) Is subject to the general taxing jurisdiction of this state.

(ii) Is registered under section 4101 of the internal revenue code for transactions in motor fuel in the bulk transfer/terminal distribution system.

(iii) Is any 1 of the following:

(a) The position holder in a terminal or refinery in this state.

(b) A person who imports fuel grade ethanol into this state.

(c) A person who acquires motor fuel from a terminal or refinery in this state from a position holder pursuant to a 2-party exchange.

(d) The position holder in a terminal or refinery outside this state with respect to motor fuel which that person imports into this state on its account.

Supplier also means a person who either produces alcohol or alcohol derivative substances in this state or produces alcohol or alcohol derivative substances for import into a terminal in this state, or who acquires immediately upon import by transport truck, tank wagon, rail car, or marine vessel into a terminal or refinery or other storage facility that is not part of a terminal or refinery, alcohol or alcohol derivative substances. A terminal operator is not considered a supplier merely because the terminal operator handles motor fuel consigned to it within a terminal. Supplier includes a permissive supplier unless otherwise specifically provided in the motor Fuel Act PA 403 of 2000 as amended.

TANK WAGON: A straight truck having 1 or more compartments other than the fuel supply tank designed or used to carry motor fuel.

TAX: Means a tax, interest, or penalty levied under this act.

TERMINAL: A motor fuel storage and distribution facility that meets all of the following requirements:

(i) Is registered as a qualified terminal by the internal revenue

service.

(ii) Is supplied by pipeline or marine vessel.

(iii) Has a rack from which motor fuel may be removed.

TERMINAL OPERATOR: A person who owns, operates, or otherwise controls a terminal.

TRANSPORT TRUCK: A semi-trailer combination rig designed or used for the purpose of transporting motor fuel over the public roads or highways.

TRANSPORTER: An operator of a railroad or rail car, tank wagon, transport truck, or other fuel transportation vehicle engaged in the business of transporting motor fuel below the terminal rack. A person who transports motor fuel into or out of this state for another person must be licensed as a transporter.

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